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YELLOWSTONE RIVER COMPACT COMMISSION

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TWENTY-EIGHTH ANNUAL REPORT
YELLOWSTONE RIVER
COMPACT COMMISSION
1979

YELLOWSTONE RIVER COMPACT COMMISSION

428 Federal Building
Helena, Montana

Honorable Ed Herschler
Governor of the State of Wyoming
Cheyenne, Wyoming

Honorable Thomas L. Judge
Governor of the State of Montana
Helena, Montana

Honorable Arthur A. Link
Governor of the State of North Dakota
Bismarck, North Dakota

Sirs:

Pursuant to Article III of the Yellowstone River Compact, the Commission submits the following twenty-eighth annual report of activities for the period ending September 30, 1979.

The Commission held a special meeting at Billings, Montana, on July 3, 1979. Mr. George L. Christopoulos, Wyoming State Engineer, Mr. Gary Fritz, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation, the designated representatives of their respective states, and Mr. Walter R. Scott, the designated Federal representative and chairman, were all present.

Others present were:

William Long, Deputy Wyoming State Engineer,
Cheyenne, Wyoming,
Clem Lord, Interstate Streams Engineer, State
Engineer's Office, Cheyenne, Wyoming,
Lou Allen, State Engineer's Office, Cheyenne,
Wyoming,
Paul Kawulok, Wyoming Board of Control,
Sheridan, Wyoming,
Tom King, Division Superintendent, State
Engineer's Office, Riverton, Wyoming,
Jack D. Palma, Deputy Attorney General,
State of Wyoming, Cheyenne, Wyoming,
Michael Dwyer, Legal Counsel, State Water
Commission, Bismarck, North Dakota,

Rick Bondy, Department of Natural Resources
and Conservation, Helena, Montana,
Richard Moy, Department of Natural Resources
and Conservation, Helena, Montana,
Donald D. MacIntyre, Chief Legal Counsel,
Department of Natural Resources and
Conservation, Helena, Montana,
George M. Pike, U.S. Geological Survey, Helena,
Montana,
L. Grady Moore, U.S. Geological Survey, Bismarck,
North Dakota,
Michelle F. Johnston, U.S. Geological Survey,
Compact Stenographer, Helena, Montana

This special meeting was called to discuss the Compact Administration Subcommittee meeting and give the subcommittee direction. Gary Fritz was introduced as the new Administrator of the Montana Department of Natural Resources and Conservation, Water Resources Division, replacing Orrin Ferris. Walter R. Scott announced his resignation as chairman of the Commission.

A special meeting of the Compact Administration Subcommittee was held at Sheridan, Wyoming, on September 11, 1979. Those present were:

L. Grady Moore, acting Federal representative and
chairman, Yellowstone Compact Commission,
Rick Bondy, Department of Natural Resources and
Conservation, Helena, Montana,
Richard Moy, Department of Natural Resources and
Conservation, Helena, Montana,
Clem Lord, Interstate Streams Engineer, State
Engineer's Office, Cheyenne, Wyoming,
Lou Allen, State Engineer's Office, Cheyenne,
Wyoming,
Paul Kawulok, Wyoming Board of Control, Sheridan,
Wyoming

The Commission held the annual meeting at Casper, Wyoming, on November 14, 1979. Mr. George L. Christopulos, Wyoming State Engineer, Mr. Gary Fritz, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation, the designated representatives of their respective states, and Mr. L. Grady Moore, the designated Federal representative and chairman, were all present.

Others present were:

Clem Lord, Interstate Streams Engineer, State
Engineer's Office, Cheyenne, Wyoming,
Lou Allen, State Engineer's Office, Cheyenne,
Wyoming,
Paul Kawulok, Wyoming Board of Control, Sheridan,
Wyoming,
Rick Oliver, State Engineer's Office, Sheridan,
Wyoming,
Rick Bondy, Department of Natural Resources and
Conservation, Helena, Montana,
Richard Moy, Department of Natural Resources and
Conservation, Helena, Montana,
George M. Pike, U.S. Geological Survey, Helena,
Montana,
Michelle F. Johnston, U.S. Geological Survey,
Compact Stenographer, Helena, Montana

There were no incidents during the year that required administration of the water in accordance with the provisions of the Compact. At the present level of water-resources development, the Commission feels that a program of intensive water-use regulations is not necessary. However, the attention of the Commission is continuing to focus on the need to define the detailed procedures for implementing Compact provisions previous to the time when development of water within the Yellowstone River Basin requires that these provisions be enforced.

The interest in Yellowstone River water for coal development and peripheral needs has continued to increase and it is evident that, at some yet undetermined time, it will be necessary to divide the waters of the Yellowstone River System as allocated by Article V of the Compact.

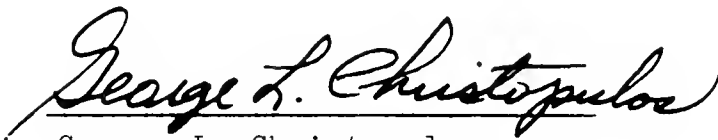
The documentation of pre-1950 water rights has been completed in Wyoming. The 1973 Montana Water Use Act is assisting that State in its documentation, although it is still incomplete.

A problem that continues to be of major long-range concern to the Commission is the lack of proper quantification of all existing water rights. Of particular concern are the water rights of the Indian tribes and the implied Federal reserved rights. The Commission believes that studies and action necessary to quantify these rights should be expedited.

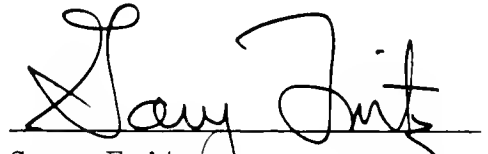
The Commission feels that due to the potential for large-scale use of water associated with coal development, joint allocation and development studies should be carried out in the near future. To accomplish this in a timely manner, the Commission recommends a proposal be submitted to the Old West Regional Commission for the support of two full-time individuals, one in Wyoming and one in Montana. These individuals would be additional staff and would have a two year work assignment.

The budgets for fiscal years 1979 through 1981 are discussed in the following general report. The amount of funds required for future Commission activities will depend largely on the outcome of water-development plans, inflation, and the degree of water administration required.

Respectfully submitted,



George L. Christopoulos
Commissioner for Wyoming



Gary Fritz
Commissioner for Montana



L. Grady Moore
Federal Representative

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GENERAL REPORT

Cost:

The work funded by the Commission, which to date has been primarily concerned with the collection of required hydrologic data, has been financed through cooperative arrangements whereby Montana and Wyoming each bear one-fourth of the cost and the remaining one-half is borne by the United States. The salaries and necessary expenses of the State and Federal representatives, and hydrologic data made available by other agencies, are not evaluated or considered as expenses of the Commission.

The expense of the Commission during Fiscal Year 1979 was \$23,880, in accordance with the budget adopted for the year.

The budgets for Fiscal Years 1980 and 1981 were tentatively adopted subject to the availability of appropriations.

The budgets for the three fiscal years are summarized as follows:

October 1, 1978, to September 30, 1979 (Fiscal Year 1979):

Continuation of existing stream-gaging programs \$23,880

October 1, 1979, to September 30, 1980 (Fiscal Year 1980):

Continuation of existing stream-gaging program 22,080

October 1, 1980, to September 30, 1981 (Fiscal Year 1981):

Estimate for continuation of existing stream-gaging program 24,280

Gaging Stations:

Gaging stations at the measuring sites specified in the Compact were continued in operation and satisfactory discharge records collected at each. In addition, it was determined that the station on Prairie Dog Creek near the Montana-Wyoming State line was not needed for Compact administration purposes. The station, was therefore, discontinued. Locations of gaging and reservoir stations are shown on a map of the Yellowstone River Basin at the end of the report.

During the water year ending September 30, 1979, annual streamflow was below average in three of the four tributaries of the Yellowstone River as given in the following table:

| <u>Measurement Point</u> | <u>Percent of Average</u> |
|---|---------------------------|
| Clarks Fork Yellowstone River near Silesia, MT | 84 |
| Bighorn River at Bighorn minus Little Bighorn River near Hardin, MT Adjusted for change in contents in Bighorn Lake | 101 |
| Tongue River at Miles City, MT | 89 |
| Powder River at Locate, MT | 69 |

Details of streamflow for Water Year 1979 and bar graphs showing comparisons with average flows during selected base periods and with the preceding year are given in appendix C.

Diversions:

There were no incidents during the year that required administration of the water in accordance with the provisions of the Compact. At the present level of water-resources development, the Commission feels that a program of intensive water-use regulations is not necessary.

Storage:

In reservoirs completed after January 1, 1950

Bighorn Lake, a Water and Power Resources Service project on the Bighorn River, and the largest storage project in the basin, contained 1,042,000 acre-feet at the beginning of the year and 977,300 acre-feet at the close. It fluctuated from a minimum of 831,200 acre-feet on March 8, 1979, to a maximum of 1,072,000 acre-feet on June 29, 1979. Boysen Reservoir, located on the Wind River and operated by the Water and Power Resources Service, began the year with 681,600 acre-feet in storage and ended with 567,900 acre-feet. Details regarding these reservoirs are given in appendix E. The Commission is cognizant of other reservoirs in this general group and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

In reservoirs existing on January 1, 1950

As a matter of record and general information, month-end storage data are given in appendix F for reservoirs in existence above the points of measurement on January 1, 1950. These data are pertinent to allocation under Article V, Section C, Item 5 of the Compact.

RULES AND REGULATIONS FOR ADMINISTRATION OF
THE YELLOWSTONE RIVER COMPACT

A compact, known as the Yellowstone River Compact, between the States of Wyoming, Montana, and North Dakota, having become effective on October 30, 1951, upon approval of the Congress of the United States, which apportions the waters of certain interstate tributaries of the Yellowstone River which are available after the appropriative rights existing in the States of Wyoming and Montana on January 1, 1950, are supplied, and after appropriative rights to the use of necessary supplemental water are also supplied as specified in the Compact, the following rules and regulations are adopted subject to the provisions for amendment revision or abrogation as provided herein.

Article I. Collection of Water Records

- A. It shall be the joint and equal responsibility of the members of the States of Wyoming and Montana to collect, cause to be collected, or otherwise furnish records of tributary streamflow at the points of measurement specified in Article V (B) of the Compact, or as near thereto as is physically or economically feasible or justified.

1. Clarks Fork

The gaging station known as Clarks Fork near Silesia, Montana and located in NW1/4 SE1/4 sec.1, T.4 S., R.23 E., shall be the point of measurement for the Clarks Fork.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River at Bighorn, Montana, and located in NE1/4 NE1/4 sec.33, T.5 N., R.34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana, and located in SW1/4 NW1/4 sec.20, T.1 S., R.34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana, and located in SE1/4 sec.23, T.7 N., R.47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River at Locate, Montana, and located in SE1/4 sec.23, T.8 N., R.51 E., shall temporarily be the designated point of measurement for that stream.

- B. Records of total annual diversion in acre-feet above the points of measurement designated in the Compact for irrigation, municipal, and industrial uses developed after January 1, 1950, shall be furnished by the members of the Commission for their respective States, at such time as the Commission deems necessary for interstate administration as provided by the terms of the Compact. Providing that if it be acceptable to the Commission, reasonable estimates thereof may be substituted.
- C. Annual records of the net change in storage in all reservoirs, not excluded under Article V (E) of the Compact, above the point of measurement specified in the Compact and completed after January 1, 1950, and the annual net change in reservoirs existing prior to January 1, 1950, which is used for irrigation, municipal, and industrial purposes developed after January 1, 1950, shall be the primary responsibility of the member of the Commission in whose State such works are located; providing such data are not furnished by Federal agencies under the provisions of Article III (D) of the Compact, or collected by the Commission.

Article II. Office and Officers

- A. The office of the Commission shall be located, and be that of the United States Geological Survey, in Helena, Montana.
- B. The Chairman of the Commission shall be the Federal representative as provided in the Compact.
- C. The Secretary of the Commission shall be as provided for in Article III of these rules.
- D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

- A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U.S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:
 - 1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.
 - 2. Assemble factual information on stream flow, diversion and reservoir storage for the preparation of an annual report to the Governors of the signatory States.
 - 3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.
- B. Act as Secretary to the Commission.

Article IV. Budget

- A. At the annual meeting of each even numbered year or prior thereto, the Commission shall adopt a budget for operation during the ensuing biennium beginning July first. Such budget shall set forth the total cost of construction, maintenance and operation of gaging stations, the cost of engineering and clerical aid, and other necessary expenses excepting the salaries and personal expenses of the Commissioners. On odd-numbered years revisions of the budget shall be considered.
- B. It shall be the obligation of the Commissioners of the States of Montana and Wyoming to endeavor to secure from the Legislature of their respective States sufficient funds with which to meet the obligations of this Compact, except insofar as provided by the Federal government.

Article V. Meetings

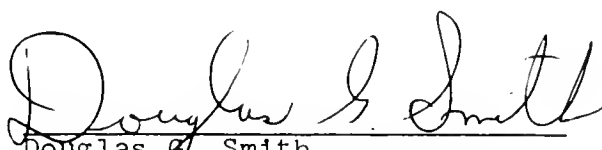
An annual meeting of the Commission shall be held each November at some mutually agreeable point in the Yellowstone River Basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction of such other business consistent with its authority; provided that by unanimous consent of the Commission the


date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approval by the Commissioners for the States of Wyoming and Montana.

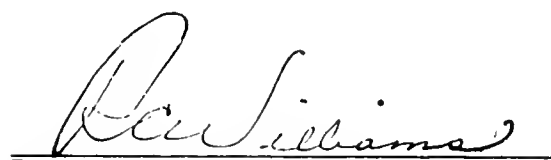
Article VI. Amendments, Revisions and Abrogations.

The Rules and Regulations of the Commission may be amended or revised by a unanimous vote at any meeting of the Commission.


Douglas G. Smith
Commissioner for Montana


Floyd A. Bishop
Commissioner for Wyoming

ATTESTED:


Robert C. Williams
Federal Representative

Adopted November 17, 1953
Amended November 9, 1970

METRIC CONVERSION TABLE

The following factors may be used to convert the inch-pound units published herein to the International System (SI) of metric units. Subsequent reports will contain both the inch-pound and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

| <u>Multiply inch-pound units</u> | <u>By</u> | <u>To obtain SI units</u> |
|---|------------|---|
| Length | | |
| feet (ft) | .3048 | meters (m) |
| miles (mi) | 1.609 | kilometers (km) |
| Area | | |
| acres | 4047 | square meters (m ²) |
| | .4047 | *hectares (ha) |
| | .4047 | square hectometer (hm ²) |
| | .004047 | square kilometers (km ²) |
| square miles (mi ²) | 2.590 | square kilometers (km ²) |
| Volume | | |
| cfs-day (ft ³ /s-day) | 2447 | cubic meters (m ³) |
| | .002447 | cubic hectometers (hm ³) |
| acre-feet (acre-ft) | 1233 | cubic meters (m ³) |
| | .001233 | cubic hectometers (hm ³) |
| | .000001233 | cubic kilometers (km ³) |
| Flow | | |
| cubic feet per second (ft ³ /s) | 28.32 | liters per second (L/s) |
| | 28.32 | cubic decimeters per second (dm ³ /s) |
| | .02832 | cubic meters per second (m ³ /s) |

*The unit hectare is approved for use with the International System (SI) for a limited time. See NBS Special Bulletin 330, p. 15, 1972 edition.

MONTHLY SUMMARY OF DISCHARGE FOR COMPACT STREAM-GAGING STATIONS

06208800 CLARKS FORK YELLOWSTONE RIVER NEAR SILESIA, MT

LOCATION.--Lat 45°30'48", long 108°49'42", in NW1/4 SE1/4 sec.1, T.4 S., R.23 E., Carbon County, Hydrologic Unit 10070006, on left bank 0.5 mi (0.8 km) downstream from Whitehorse Canal intake, 1 mi (2 km) upstream from Rock Creek, 3 mi (5 km) south of Silesia, and at mile 19 (31 km).

DRAINAGE AREA.--2,093 mi² (5,421 km²).

PERIOD OF RECORD.--October 1969 to current year. Records for July 1921 to September 1969 (published as Clarks Fork Yellowstone River at Edgar) at site 5 mi (8 km) upstream not equivalent owing to diversion in Whitehorse Canal during irrigation season. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Datum of gage is 3,405.79 ft (1,038.085 m), National Geodetic Vertical Datum of 1929 (levels by Army Corps of Engineers).

REMARKS.--Records good except those for winter period, which are poor. Diversion for irrigation of about 42,600 acres (172 km²) of which 1,100 acres (4.45 km²) lie below station. In addition, about 9,000 acres (36.4 km²) of land above station are irrigated by diversions from the adjoining Rock Creek basin.

AVERAGE DISCHARGE.--10 years, 1,209 ft³/s (34.24 m³/s), 875,900 acre-ft/yr (1.08 km³/yr).

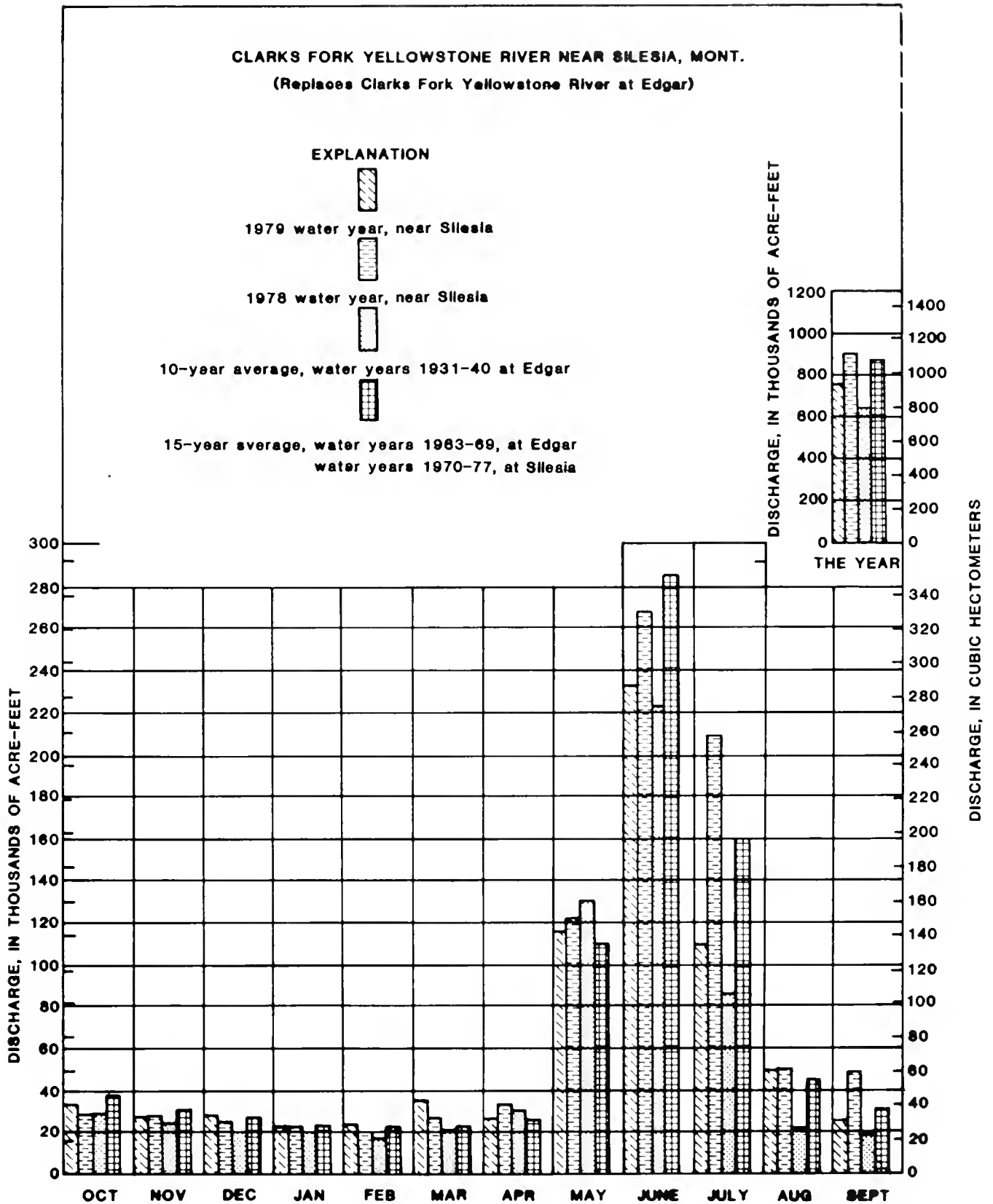
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,800 ft³/s (334 m³/s) June 10, 1972, gage height, 7.51 ft (2.289 m); maximum gage height, 7.82 ft (2.384 m) July 6, 1975; minimum discharge, 88 ft³/s (2.36 m³/s) July 21, 1977, gage height, 0.72 ft (0.219 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 5,300 ft³/s (150 m³/s) and maximum (*):

| Date | Time | Discharge | | Gage height | |
|---------|------|----------------------|---------------------|-------------|-------|
| | | (ft ³ /s) | (m ³ /s) | (ft) | (m) |
| May 28 | 1600 | 6,380 | 181 | 5.79 | 1.765 |
| June 7 | 0900 | 5,690 | 161 | 5.47 | 1.667 |
| June 15 | 1300 | *7,440 | 211 | *6.25 | 1.905 |

Minimum daily discharge, 280 ft³/s (7.93 m³/s) Dec. 31.

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|-------|---------|---------|----------------------|
| October 1978 | 17,737 | 572 | 768 | 455 | 35,180 |
| November | 14,665 | 489 | 620 | 340 | 29,090 |
| December | 15,640 | 505 | 580 | 280 | 31,020 |
| January 1979 | 11,500 | 371 | 440 | 300 | 22,810 |
| February | 13,110 | 468 | 560 | 340 | 26,000 |
| March | 18,287 | 590 | 900 | 427 | 36,270 |
| April | 15,189 | 506 | 673 | 388 | 30,130 |
| May | 59,700 | 1,926 | 5,980 | 503 | 118,400 |
| June | 117,240 | 3,908 | 7,080 | 1,770 | 232,500 |
| July | 55,345 | 1,785 | 4,340 | 874 | 109,800 |
| August | 25,765 | 831 | 1,380 | 453 | 51,100 |
| September 1979 | 13,461 | 449 | 739 | 330 | 26,700 |
| 1979 water year | 377,639 | 1,035 | 7,080 | 280 | 749,000 |



Comparison of discharge during 1979 water year with 1978 water year near Silesia and with average discharge for water years 1931-40 and 1963-69 at Edgar and for water years 1970-77 at Silesia.

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT

LOCATION.--Lat 45°44'10", long 107°33'24", in NW1/4 SW1/4 NW1/4 sec.20, T.1 S., R.34 E., Big Horn County, Hydrologic Unit 10080016, downstream from bridge on Sarpy Road, 0.2 mi (0.3 km) upstream from terminal wasteway of Agency Canal, 0.6 mi (1.0 km) upstream from mouth, and 2.3 mi (3.7 km) east of Hardin.

DRAINAGE AREA.--1,294 mi² (3,351 km²).

PERIOD OF RECORD.--June 1953 to current year. Records since June 1953 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Nonrecording gage. Datum of gage is 2,891.64 ft (881.372 m) National Geodetic Vertical Datum of 1929 (levels by Army Corps of Engineers). Prior to Oct. 7, 1953, nonrecording gage at site 0.4 mi (0.6 km) downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mi (0.5 km) downstream. May 6, 1963, to Nov. 6, 1963, nonrecording gage at site 0.4 mi (0.6 km) downstream. All at different datums. Nov. 7, 1963, to Aug. 15, 1976, water-stage recorder at site 35 ft (11 m) downstream at present datum. Aug. 15, 1976, to Sept. 30, 1978, water-stage recorders located on each bank downstream of Sarpy Road bridge and were used depending on control conditions. The left-bank gage is given in the "LOCATION" paragraph. The right-bank gage location was lat 45°44'10", long 107°33'25", in SW1/4 NW1/4 NW1/4 sec. 20, T.1 S., R.34 E., at approximately the same datum. Oct. 1, 1978, to Sept. 30, 1979, nonrecording gage on Sarpy Road bridge.

REMARKS.--Records fair except those for winter periods, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity 23,000 acre-ft, 28.4 hm³). Diversions for irrigation of about 17,000 acres (68.8 km²) above station. Figures of discharge given herein include flow of terminal wasteway of Agency Canal.

AVERAGE DISCHARGE.--26 years, 326 ft³/s (9.232 m³/s), 236,200 acre-ft/yr (291 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,600 ft³/s (640 m³/s), revised, May 19, 1978, gage height, 11.20 ft (3.414 m), used gage height as obtained at bridge on Sarpy Road; maximum gage height, 11.78 ft (3.591 m) Mar. 20, 1960, site and datum then in use (backwater from ice); minimum discharge observed, 0.20 ft³/s (0.006 m³/s) Aug. 7, 1961, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,900 ft³/s (53.8 m³/s) Mar. 16; minimum observed, 73 ft³/s (2.07 m³/s) Sept. 12.

REVISIONS.--Monthly summary figures published in the 1978 Yellowstone River Compact Commission report are superseded by those figures published in appendix D.

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1978 | 8,564 | 276 | 295 | 257 | 16,990 |
| November | 7,436 | 248 | 351 | 170 | 14,750 |
| December | 6,910 | 223 | 310 | 120 | 13,710 |
| January 1979 | 5,635 | 182 | 250 | 120 | 11,180 |
| February | 5,795 | 207 | 270 | 130 | 11,490 |
| March | 25,535 | 824 | 1,900 | 260 | 50,650 |
| April | 17,885 | 596 | 805 | 453 | 35,470 |
| May | 18,354 | 592 | 1,220 | 363 | 36,410 |
| June | 19,346 | 645 | 1,020 | 343 | 38,370 |
| July | 5,136 | 166 | 300 | 97 | 10,190 |
| August | 3,962 | 128 | 169 | 103 | 7,860 |
| September 1979 | 3,129 | 104 | 127 | 86 | 6,210 |
| 1979 water year | 127,687 | 350 | 1,900 | 86 | 253,300 |

06294700 BIGHORN RIVER AT BIGHORN, MT

LOCATION.--Lat 46°08'50", long 107°28'00", in NE1/4 NE1/4 sec.33, T.5 N., R.34 E., Treasure County, Hydrologic Unit 10080015, on right bank just downstream from bridge on old U.S. Highway 10, 0.3 mi (0.5 km) downstream from bridge on Interstate Highway 94, 0.7 mi (1.1 km) upstream from mouth, 1.3 mi (2.1 km) southwest of Bighorn, and 4.4 mi (7.1 km) east of Custer.

DRAINAGE AREA.--22,885 mi² (59,272 km²). Area at site used prior to Oct. 7, 1955, 22,410 mi² (59,042 km²).

PERIOD OF RECORD.--May 1945 to current year. Published as "near Custer", 1945-55. Records since January 1950 available in annual reports of the Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,690 ft (820 m), by barometer. May 11 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder, at site 4 mi (6 km) upstream at different datum.

REMARKS.--Records fair except those for winter period, which are poor. Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft, 1.67 km³). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft (1.73 km³), see appendixes E and F. Diversions for irrigation of about 465,000 acres (1,880 km²) above station.

AVERAGE DISCHARGE.--34 years, 3,975 ft³/s (112.6 m³/s) 2,876,000 acre-ft/yr (3.55 km³/yr), unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 57,000 ft³/s (1,610 m³/s) May 20, 1978, gage height, 14.00 ft (4.267 m); maximum gage height recorded, 14.21 ft (4.331 m) Apr. 2, 1965 (ice jam); minimum discharge, about 275 ft³/s (7.79 m³/s) Nov. 15, 1959, result of freezeup; minimum daily, 400 ft³/s (11.3 m³/s) Apr. 4, 1967.

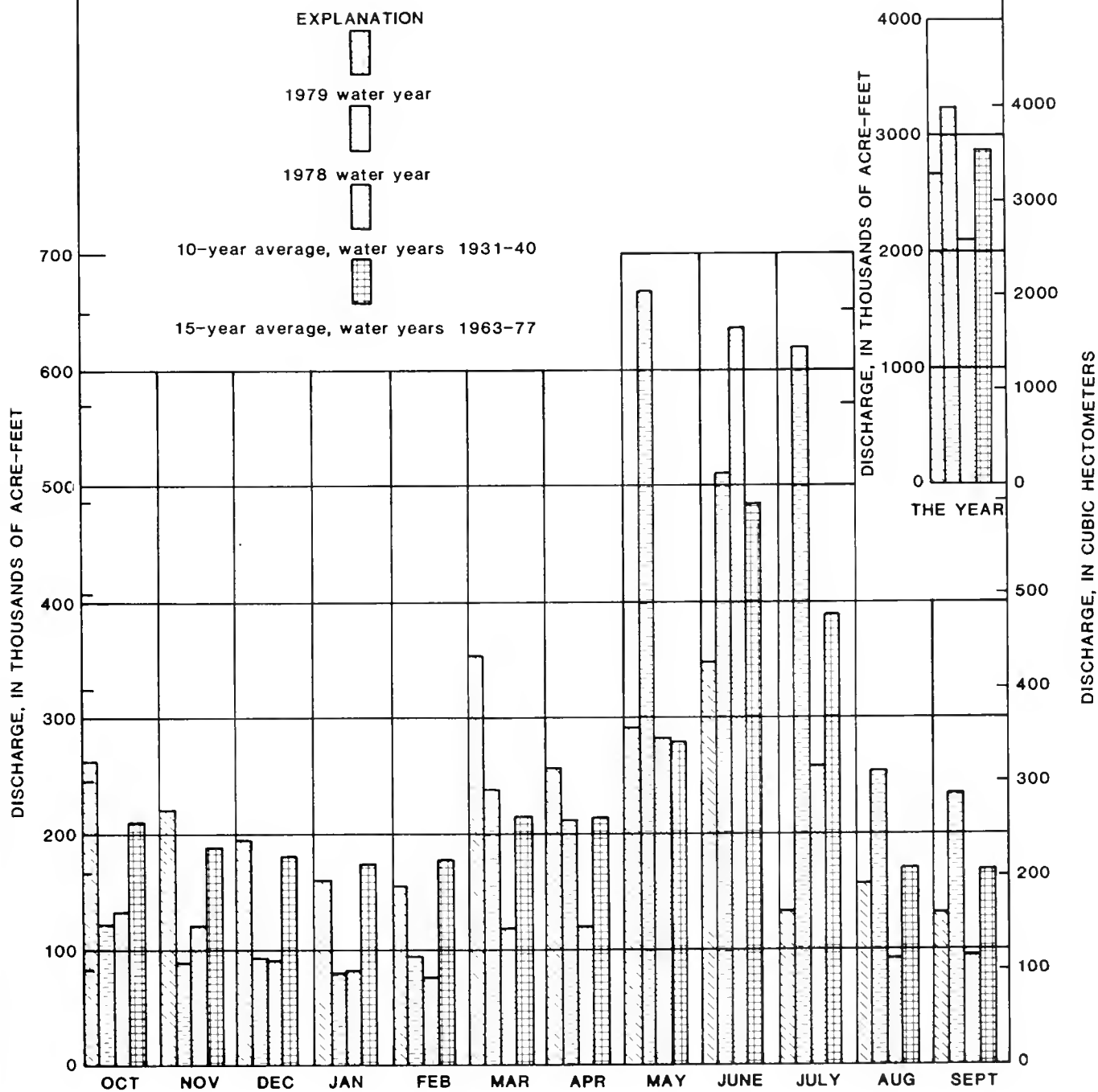
EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,180 ft³/s (260 m³/s) Mar. 14, gage height, 5.44 ft (1.658 m); maximum gage height, about 10.10 ft (3.079 m) Mar. 13 (backwater from ice jam); minimum daily discharge, 1,020 ft³/s (28.9 m³/s) Nov. 12, 13.

REVISIONS.--Monthly summary figures published in 1978 Yellowstone River Compact Commission report are superseded by those figures published in appendix D.

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet | Adjusted runoff, in acre-feet* |
|-----------------|------------------|-------|---------|---------|----------------------|--------------------------------|
| Oct. 1978 | 135,330 | 4,365 | 4,660 | 2,050 | 268,400 | 268,400 |
| Nov. | 134,810 | 4,494 | 5,640 | 1,020 | 267,400 | 230,400 |
| Dec. | 143,960 | 4,644 | 4,900 | 3,600 | 285,500 | 211,200 |
| Jan. 1979 | 113,200 | 3,652 | 4,000 | 3,300 | 224,500 | 181,300 |
| Feb. | 116,400 | 4,157 | 4,600 | 3,600 | 230,900 | 179,900 |
| Mar. | 175,750 | 5,669 | 8,430 | 4,300 | 348,600 | 396,400 |
| Apr. | 136,990 | 4,566 | 4,880 | 4,240 | 271,700 | 290,200 |
| May | 134,290 | 4,332 | 6,010 | 3,280 | 266,400 | 326,300 |
| June | 142,750 | 4,758 | 6,150 | 3,320 | 283,100 | 386,400 |
| July | 111,590 | 3,600 | 4,970 | 3,100 | 221,300 | 145,000 |
| Aug. | 94,950 | 3,063 | 3,660 | 2,350 | 188,300 | 172,800 |
| Sept. 1979 | 67,300 | 2,243 | 2,370 | 2,100 | 133,500 | 133,600 |
| 1979 water year | 1,507,320 | 4,130 | 8,430 | 1,020 | 2,990,000 | 2,924,900 |

* Adjusted for change in contents in Bighorn Lake.

BIGHORN RIVER AT BIGHORN, MONT.
 (Adjusted for change in contents in Bighorn Lake
 minus
 Little Bighorn River near Hardin, Mont.)



Comparison of discharge for 1979 water year with 1978 water year and with average discharge for water years 1931-40 and 1963-77.

06306250 PRAIRIE DOG CREEK NEAR ACME, WY

LOCATION.--Lat 44°59'02", long 106°50'21", in NE1/4 SW1/4 SW1/4 sec.23, T.58 N., R.83 W., Sheridan County, Hydrologic Unit 10090101, on right bank, 600 ft (183 m) upstream from county bridge, 0.9 mi (1.5 km) upstream from mouth, 2.8 mi (4.5 km) downstream from Coutant Creek, and 7.6 mi (12.2 km) northeast of Acme.

DRAINAGE AREA.--358 mi² (927 km²).

PERIOD OF RECORD.--October 1970 to September 1979 (discontinued). Records for May 1965 to September 1970 in files of Office of Wyoming State Engineer. Records since October 1970 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 3,450 ft (1,052 m), from topographic map.

REMARKS.--Records good except those for winter period, which are poor. Diversions above stations for irrigation of about 13,600 acres (55.0 km²) of which about 60 acres (243,000 m²) lies below station. Flow supplemented by three transbasin diversions from North Piney Creek and South Piney Creek via Prairie Dog ditch, Piney and Cruse ditches and Mead-Coffeen ditch.

AVERAGE DISCHARGE.--9 years, 46.2 ft³/s (1.308 m³/s), 33,470 acre-ft/yr (41.3 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,940 ft³/s (112 m³/s) May 19, 1978, gage height, 12.60 ft (3.840 m), from rating curve extended above 662 ft³/s (18.7 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.3 ft³/s (0.178 m³/s) June 4, 5, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 265 ft³/s (7.50 m³/s) Mar. 17, gage height, 3.85 ft (1.173 m); minimum daily, 14 ft³/s (0.40 m³/s) July 24, Aug. 9.

REVISIONS.--Monthly summary figures published in the 1978 Yellowstone River Compact Commission report are superseded by those figures published in appendix D.

| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|------|---------|---------|----------------------|
| October 1978 | 1,233 | 39.8 | 44 | 33 | 2,450 |
| November | 1,142 | 38.1 | 56 | 30 | 2,270 |
| December | 768 | 24.8 | 32 | 15 | 1,520 |
| January 1979 | 586 | 18.9 | 24 | 16 | 1,160 |
| February | 658 | 23.5 | 29 | 19 | 1,310 |
| March | 3,193 | 103 | 249 | 21 | 6,330 |
| April | 2,130 | 71.0 | 101 | 51 | 4,220 |
| May | 1,467 | 47.3 | 76 | 39 | 2,910 |
| June | 1,098 | 36.6 | 79 | 28 | 2,180 |
| July | 847 | 27.3 | 66 | 14 | 1,680 |
| August | 1,135 | 36.6 | 58 | 14 | 2,250 |
| September 1979 | 1,346 | 44.9 | 54 | 37 | 2,670 |
| 1979 water year | 15,603 | 42.7 | 249 | 14 | 30,950 |

06308500 TONGUE RIVER AT MILES CITY, MT

LOCATION.--Lat 46°20'44", long 105°48'10", in SE1/4 sec.23, T.7 N., R.47 E., Custer County, Hydrologic Unit 10090102, on right bank 4 mi (6 km) south of Miles City and 8 mi (13 km) upstream from mouth.

DRAINAGE AREA.--5,379 mi² (13,932 km²).

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to current year. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharges only for some periods, published in WSP 1309. Records since January 1950 available in annual reports of Yellowstone Compact Commission.

GAGE.--Water-stage recorder. Datum of gage is 2,375.76 ft (724.132 m), National Geodetic Vertical Datum of 1929 (levels by Army Corps of Engineers). April 1938 to April 1942, nonrecording gage at site 8 mi (13 km) upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft (0.305 m) higher.

REMARKS.--Water-discharge records good except those for winter period, which are poor. Flow regulation by Tongue River Reservoir (appendix F) only, and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft, 18.5 hm³). Diversions for irrigation of about 90,000 acres (364 km²) above station.

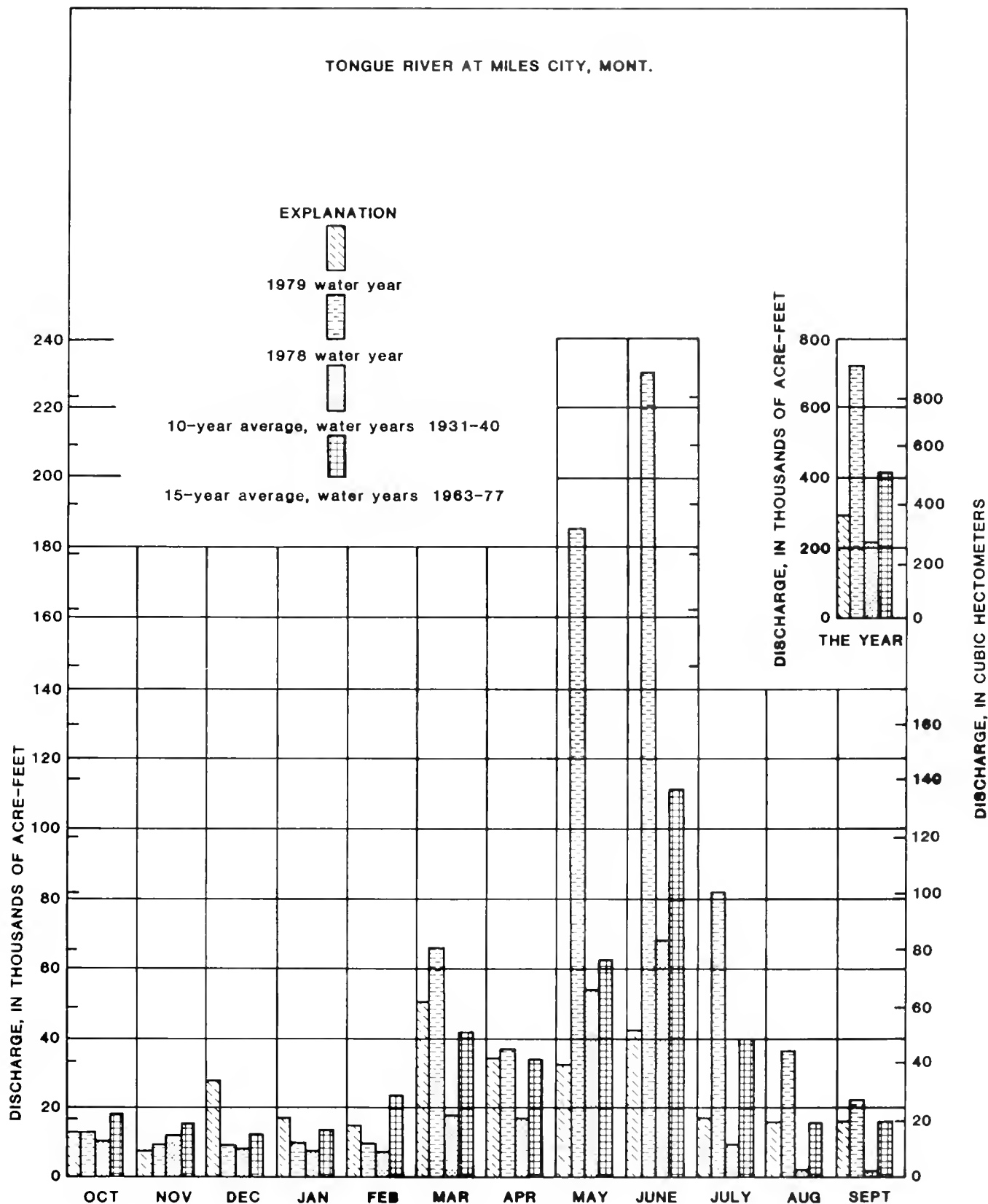
AVERAGE DISCHARGE.--36 years (1938-41, 1946-79), 454 ft³/s (12.86 m³/s), 328,900 acre-ft/yr (406 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,300 ft³/s (337 m³/s) June 15, 1962, gage height, 12.33 ft (3.758 m), present datum, from rating curve extended above 5,200 ft³/s (147 m³/s) on basis of float measurement; maximum gage height, 13.27 ft (4.045 m), present datum, Mar. 19, 1960, Feb. 15, 1971 (ice jam); no flow July 9-19, Aug. 13, 14, Sept. 28, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 3,700 ft³/s (105 m³/s) Mar. 17, maximum gage height, 8.58 ft (2.615 m); Mar. 15 (ice jam); minimum daily discharge, 105 ft³/s (2.97 m³/s) Nov. 21 (result of freezeup).

REVISIONS.--Monthly summary figures published in the 1978 Yellowstone River Compact Commission report are superseded by those figures published in appendix D.

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1978 | 7,861 | 254 | 342 | 184 | 15,590 |
| November | 4,509 | 150 | 210 | 105 | 8,940 |
| December | 11,990 | 387 | 490 | 260 | 23,780 |
| January 1979 | 9,360 | 302 | 350 | 260 | 18,570 |
| February | 7,540 | 269 | 310 | 250 | 14,960 |
| March | 25,521 | 823 | 2,700 | 250 | 50,620 |
| April | 17,528 | 584 | 814 | 451 | 34,770 |
| May | 16,363 | 528 | 777 | 435 | 32,460 |
| June | 21,342 | 711 | 1,180 | 400 | 42,330 |
| July | 8,983 | 290 | 582 | 115 | 17,820 |
| August | 8,663 | 279 | 430 | 225 | 17,180 |
| September 1979 | <u>8,773</u> | 292 | 377 | 128 | <u>17,400</u> |
| 1979 water year | 148,433 | 407 | 2,700 | 105 | 294,400 |



Comparison of discharge during 1979 water year with 1978 water year and with average discharge for water years 1931-40 and 1963-77.

06326500 POWDER RIVER AT LOCATE, MT

LOCATION.--Lat 46°25'48", long 105°18'34", in SW1/4 SW1/4 SE1/4 sec.23, T.8 N., R.51 E., Custer County, Hydrologic Unit 10090209, on right bank at downstream side of bridge on Highway 12, 0.12 mi (0.19 km) west of Locate, and 25 mi (40 km) east of Miles City.

DRAINAGE AREA.--13,189 mi² (34,160 km²). Drainage area at site used Oct. 1, 1977, to Mar. 21, 1978, 13,194 mi² (34,172 km²).

PERIOD OF RECORD.--March 1938 to current year. Oct. 5, 1966, to Mar. 21, 1978, published as "near Locate." Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

REVISED RECORDS.--WSP 926: 1939. WSP 1309: 1938-39 (M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 2,384.79 ft (726.884 m) National Geodetic Vertical Datum of 1929 (levels by Army Corps of Engineers). Prior to July 11, 1947, non-recording gage at bridge 50 ft (15 m) upstream, and July 11, 1947, to Sept. 30, 1965, water-stage recorder at present site and datum. Oct. 1, 1965, to Oct. 4, 1966, nonrecording gage, and Oct. 5, 1966, to Mar. 21, 1978, water-stage recorder 1.5 mi (2.4 km) downstream at different datum.

REMARKS.--Records good except those for winter period, which are poor, and those for July 7 to Sept. 30, which are fair. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft (45.4 hm³). Diversions for irrigation of about 74,500 acres (302 km²) above station.

AVERAGE DISCHARGE.--41 years, 632 ft³/s (17.90 m³/s), 475,900 acre-ft/yr (565 hm³/yr).





EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 31,000 ft³/s (878 m³/s) Feb. 19, 1943, maximum gage height, 12.27 ft (3.740 m) Mar. 16, 1978 (backwater from ice); no flow Jan. 16 to Feb. 12, Feb. 22-24, 1950, July 27, Sept. 21-27, Oct. 1, 1960, Sept. 4-8, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 5,500 ft³/s (156 m³/s) Mar. 18, gage height, 6.68 ft (2.036 m), only peak above base of 5,000 ft³/s (142 m³/s); maximum gage height, 6.91 ft (2.106 m) Mar. 18 (backwater from ice jam); minimum daily discharge, 62 ft³/s (1.76 m³/s) Nov. 21 (result of freezeup).

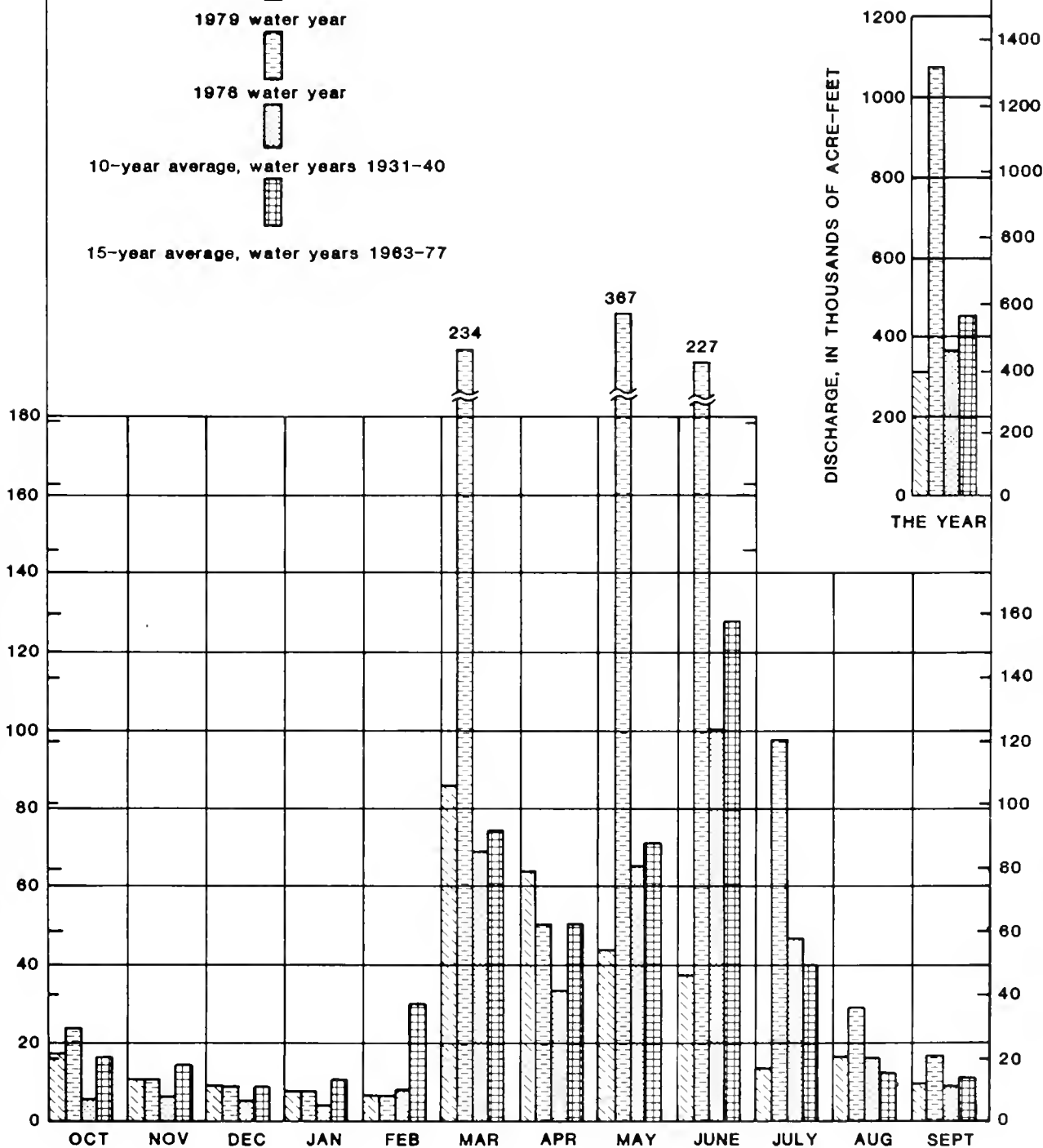
| Month | Second-foot days | Mean | Maximum | Minimum | Runoff, in acre-feet |
|-----------------|------------------|-------|---------|---------|----------------------|
| October 1978 | 9,205 | 297 | 318 | 277 | 18,260 |
| November | 5,175 | 173 | 338 | 62 | 10,260 |
| December | 4,954 | 160 | 220 | 70 | 9,830 |
| January 1979 | 3,897 | 126 | 180 | 70 | 7,730 |
| February | 3,376 | 121 | 170 | 90 | 6,700 |
| March | 42,450 | 1,370 | 5,020 | 110 | 84,380 |
| April | 32,195 | 1,073 | 1,470 | 654 | 63,860 |
| May | 21,598 | 697 | 965 | 517 | 42,840 |
| June | 19,375 | 646 | 1,200 | 412 | 38,430 |
| July | 7,049 | 227 | 407 | 93 | 13,980 |
| August | 8,588 | 277 | 702 | 110 | 17,030 |
| September 1979 | 5,314 | 177 | 424 | 73 | 10,540 |
| 1979 water year | 163,266 | 447 | 5,020 | 62 | 323,800 |

POWDER RIVER AT LOCATE, MONT.

EXPLANATION

-  1979 water year
-  1978 water year
-  10-year average, water years 1931-40
-  15-year average, water years 1963-77

DISCHARGE, IN THOUSANDS OF ACRE-FEET



DISCHARGE, IN CUBIC HECTOMETERS

REVISED MONTHLY SUMMARY OF DISCHARGE FOR COMPACT STREAM-GAGING
STATIONS, 1978 WATER YEAR

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1977 | 5,128 | 165 | 189 | 152 | 10,170 |
| November | 4,607 | 154 | 180 | 100 | 9,140 |
| December | 4,470 | 144 | 170 | 100 | 8,870 |
| January 1978 | 3,810 | 123 | 150 | 100 | 7,560 |
| February | 3,930 | 140 | 160 | 120 | 7,800 |
| March | 12,612 | 407 | 1,120 | 110 | 25,020 |
| April | 11,521 | 384 | 2,380 | 197 | 22,850 |
| May | 88,409 | 2,852 | 15,800 | 853 | 175,400 |
| June | 54,540 | 1,818 | 2,380 | 1,280 | 108,200 |
| July | 22,182 | 716 | 1,420 | 342 | 44,000 |
| August | 8,326 | 269 | 356 | 198 | 16,510 |
| September 1978 | 8,009 | 267 | 503 | 154 | 15,890 |
| 1978 water year | 227,544 | 623 | 15,800 | 100 | 451,300 |

06294700 BIGHORN RIVER AT BIGHORN, MT

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre feet</u> | <u>Adjusted runoff, in acre-feet*</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|---------------------------------------|
| October 1977 | 46,487 | 1,500 | 1,800 | 917 | 92,210 | 132,100 |
| November | 36,690 | 1,223 | 2,400 | 600 | 72,770 | 96,800 |
| December | 66,770 | 2,154 | 3,100 | 1,200 | 132,400 | 99,300 |
| January 1978 | 77,100 | 2,487 | 3,000 | 1,900 | 152,900 | 90,400 |
| February | 91,720 | 3,276 | 4,200 | 2,400 | 181,900 | 103,300 |
| March | 155,580 | 5,019 | 7,840 | 3,200 | 308,600 | 260,400 |
| April | 130,880 | 4,363 | 8,570 | 2,800 | 259,600 | 288,800 |
| May | 275,720 | 8,894 | 50,000 | 3,560 | 546,900 | 843,100 |
| June | 289,880 | 9,663 | 11,400 | 8,170 | 575,000 | 615,000 |
| July | 330,550 | 10,660 | 11,700 | 8,350 | 655,600 | 671,600 |
| August | 203,590 | 6,567 | 8,320 | 4,280 | 403,800 | 269,800 |
| September 1978 | 113,220 | 3,774 | 5,590 | 2,890 | 224,600 | 246,600 |
| 1978 water year | 1,818,187 | 4,981 | 50,000 | 600 | 3,606,000 | 3,716,900 |

*Adjusted for change in contents in Bighorn Lake

06306250 PRAIRIE DOG CREEK NEAR ACME, WY

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1977 | 1,274 | 41.1 | 58 | 31 | 2,530 |
| November | 833 | 27.8 | 39 | 14 | 1,650 |
| December | 818 | 26.4 | 52 | 9.0 | 1,620 |
| January 1978 | 545 | 17.6 | 25 | 10 | 1,080 |
| February | 514 | 18.4 | 25 | 12 | 1,020 |
| March | 3,097 | 99.9 | 343 | 10 | 6,140 |
| April | 1,381 | 46.0 | 189 | 28 | 2,740 |
| May | 11,893 | 384 | 3,090 | 69 | 23,590 |
| June | 2,587 | 86.2 | 227 | 35 | 5,130 |
| July | 980 | 31.6 | 48 | 18 | 1,940 |
| August | 1,416 | 45.7 | 65 | 27 | 2,810 |
| September 1978 | 1,235 | 41.2 | 61 | 24 | 2,450 |
| 1978 water year | 26,573 | 72.8 | 3,090 | 9.0 | 52,700 |

06308500 TONGUE RIVER AT MILES CITY, MT

| <u>Month</u> | <u>Second-foot days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1977 | 7,745 | 250 | 451 | 171 | 15,360 |
| November | 5,251 | 175 | 243 | 110 | 10,420 |
| December | 5,305 | 171 | 235 | 100 | 10,520 |
| January 1978 | 5,175 | 167 | 180 | 130 | 10,260 |
| February | 4,945 | 177 | 260 | 135 | 9,810 |
| March | 33,299 | 1,074 | 4,800 | 180 | 66,050 |
| April | 19,437 | 648 | 684 | 600 | 38,550 |
| May | 92,482 | 2,983 | 7,700 | 552 | 183,400 |
| June | 114,740 | 3,825 | 4,940 | 3,170 | 227,600 |
| July | 41,334 | 1,333 | 2,780 | 866 | 81,990 |
| August | 19,148 | 618 | 919 | 352 | 37,980 |
| September 1978 | <u>11,095</u> | 370 | 697 | 203 | <u>22,010</u> |
| 1978 water year | 359,956 | 986 | 7,700 | 100 | 714,000 |

06326500 POWDER RIVER AT LOCATE, MT

| <u>Month</u> | <u>Second foot-days</u> | <u>Mean</u> | <u>Maximum</u> | <u>Minimum</u> | <u>Runoff, in acre-feet</u> |
|-----------------|-------------------------|-------------|----------------|----------------|-----------------------------|
| October 1977 | 11,566 | 373 | 1,030 | 188 | 22,940 |
| November | 5,272 | 176 | 265 | 86 | 10,460 |
| December | 4,560 | 147 | 170 | 100 | 9,040 |
| January 1978 | 4,252 | 137 | 170 | 120 | 8,430 |
| February | 3,602 | 129 | 140 | 120 | 7,140 |
| March | 118,165 | 3,812 | 20,000 | 120 | 234,400 |
| April | 25,908 | 864 | 2,170 | 444 | 51,390 |
| May | 185,057 | 5,970 | 22,200 | 436 | 367,100 |
| June | 114,640 | 3,821 | 6,090 | 2,280 | 227,400 |
| July | 48,355 | 1,560 | 2,710 | 752 | 95,910 |
| August | 13,718 | 443 | 779 | 305 | 27,210 |
| September 1978 | <u>8,451</u> | 282 | 690 | 96 | <u>16,760</u> |
| 1978 water year | 543,546 | 1,489 | 22,200 | 86 | 1,078,000 |

MONTHLY SUMMARY OF CONTENTS FOR COMPACT RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

06258900 BOYSEN RESERVOIR, WY

LOCATION.--Lat 43°25'00", long 108°10'37", in NW1/4 NW1/4 sec.16, T.5 N., R.6 E., Fremont County, at dam on Wind River, 13 mi (21 km) north of Shoshoni, Wyoming.

DRAINAGE AREA.--7,700 mi² (19,943 km²).

PERIOD OF RECORD.--October 1951 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by Water and Power Resources Service).

REMARKS.--Reservoir is formed by rock-fill dam completed in October 1951. Storage began Oct. 11, 1951. Usable capacity, 742,100 acre-ft (915 hm³) between elevation 4,657.00 ft (1,419.454 m), invert of penstock pipe, and 4,725.00 ft (1,440.180 m), top of spillway gate. Dead storage, 59,880 acre-ft (73.8 hm³) below elevation 4,657.00 ft (1,419.454 m). Prior to Jan. 1, 1966, usable capacity was 757,800 acre-ft (934 hm³) and dead storage was 62,000 acre-ft (76.4 hm³), at same elevations. Crest of dam is at elevation 4,758 ft (1,450 m). Figures given herein represent usable contents. Water used for irrigation, flood control, and power development.

COOPERATION.--Records furnished by Water and Power Resources Service.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 862,500 acre-ft (1,060 hm³) July 6, 7, 1967, elevation, 4,730.83 ft (1,441.957 m); minimum daily since normal use of water started, 189,800 acre-ft (234 hm³) Mar. 18, 19, 1956, elevation, 4,684.18 ft (1,427.738 m), capacity table then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 575,700 acre-ft (710 hm³) Sept. 6, elevation, 4,715.79 ft (1,437.373 m); minimum daily, 433,900 acre-ft (535 hm³) May 17, elevation, 4,706.48 ft (1,434.535 m).

| <u>Month</u> | <u>Water-surface elevation, in feet</u> | <u>Contents*, in acre-feet</u> | <u>Change in contents, in acre-feet</u> |
|-----------------------------|---|------------------------------------|---|
| September 30, 1978. | 4,721.82 | 681,600 | |
| October 31. | 4,719.60 | 641,300 | -40,300 |
| November 30 | 4,716.73 | 591,500 | -49,800 |
| December 31 | 4,714.42 | 553,300 | -38,200 |
| January 31, 1979. | 4,712.54 | 523,500 | -29,800 |
| February 28 | 4,711.04 | 500,500 | -23,000 |
| March 31. | 4,711.54 | 508,100 | +7,600 |
| April 30. | 4,707.34 | 446,100 | -62,000 |
| May 31. | 4,712.65 | 525,200 | +79,100 |
| June 30 | 4,715.10 | 564,300 | +39,100 |
| July 31 | 4,714.73 | 558,300 | -6,000 |
| August 31 | 4,715.71 | 574,400 | +16,100 |
| September 30, 1979. | 4,715.32 | 567,900 | -6,500 |
| 1979 water year | | | -113,700 |

* Does not include dead storage of 59,880 acre-feet (73.8 hm³).

06260300 ANCHOR RESERVOIR, WY

LOCATION.--Lat 43°39'50", long 108°49'27", in sec.26, T.43 N., R.100 W., Hot Springs County, at dam on South Fork Owl Creek, 2 mi (3 km) downstream from Middle Fork, 3 mi (5 km) southeast of Anchor, and 32 mi (51 km) west of Thermopolis.

DRAINAGE AREA.--125 mi² (324 km²), approximately.

PERIOD OF RECORD.--November 1960 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (Water and Power Resources Service datum).

REMARKS.--Reservoir is formed by concrete arch dam completed in 1960. Usable capacity, 17,170 acre-ft (21.2 hm³) between elevation 6,343.75 ft (1,933.575 m), invert of river outlet, and 6,441.00 ft (1,963.217 m), spillway crest, not including 68 acre-ft (83,800 m³) below elevation 6,343.75 ft (1,933.575 m). Prior to Oct. 1, 1971, usable capacity was 17,280 acre-ft (21.3 hm³) not including 149 acre-ft (184,000 m³) below the invert. Figures given herein represent usable contents. Water is used for irrigation of land in Owl Creek basin.

COOPERATION.--Records furnished by Water and Power Resources Services.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 9,250 acre-ft (11.4 hm³) July 4, 1967 (elevation, 6,418.52 ft or 1,956.365 m); no storage on many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 899 acre-ft (1.11 hm³) May 30, (elevation, 6,370.19 ft or 1,941.634 m); no storage on many days.

| Month | Water-surface elevation, in feet | Contents*, in acre-feet | Change in contents, in acre-feet |
|-----------------------------|--|----------------------------|-------------------------------------|
| September 30, 1978. | - | 0 | 0 |
| October 31. | - | 0 | 0 |
| November 30 | - | 0 | 0 |
| December 31 | - | 0 | 0 |
| January 31, 1979. | - | 0 | 0 |
| February 28 | - | 0 | 0 |
| March 31. | - | 0 | 0 |
| April 30. | - | 0 | 0 |
| May 31. | 6,369.35 | 842 | +842 |
| June 30 | - | 0 | -842 |
| July 31 | - | 0 | 0 |
| August 31 | - | 0 | 0 |
| September 30, 1979. | - | 0 | 0 |
| 1979 water year | | | 0 |

*Does not include dead storage of 68 acre-feet (83,800 m³).

06286400 BIGHORN LAKE NEAR ST. XAVIER, MT

LOCATION.--Lat 45°18'27", long 107°57'26", in SW1/4 SE1/4 sec.18, T.6 S., R.31 E., Big Horn County, Hydrologic Unit 10080010, in block 13 of Yellowtail Dam on Bighorn River, 1.3 mi (2.1 km) upstream from Grapevine Creek, 15.5 mi (24.9 km) southeast of St. Xavier, and at mile 81.0 (130.3 km).

DRAINAGE AREA.--19,626 mi² (50,831 km²).

PERIOD OF RECORD.--November 1965 to current year (monthend contents only). Prior to October 1969, published as "Yellowtail Reservoir."

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by Water and Power Resources Service).

REMARKS.--Reservoir is formed by thin concrete-arch dam; construction began in 1961; completed in 1967. Storage began Nov. 3, 1965. Usable capacity, 1,356,000 acre-ft (1.67 km³) between elevation 3,296.50 ft (1,004.773 m), river outlet invert, and 3,657.00 ft (1,114.654 m), top of flood control. Elevation of spillway crest, 3,593.00 ft (1,095.146 m). Normal maximum operating level, 1,097,000 acre-ft (1.35 km³), elevation, 3,640.00 ft (1,109.472 m). Minimum operating level, 483,400 acre-ft (596 hm³), elevation 3,547.00 ft (1,081.126 m). Dead storage, 18,970 acre-ft (23.4 hm³) below elevation 3,296.50 ft (1,004.773 m). Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

COOPERATION.--Elevations and capacity table furnished by Water and Power Resources Service.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,346,000 acre-ft (1.66 km³) July 6, 1967, elevation, 3,656.43 ft (1,114.480 m); minimum since first filling, 660,700 acre-ft (815 hm³) Mar. 11, 1970, elevation, 3,584.45 ft (1,092.540 m).

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 1,072,000 acre-ft (1.32 km³) June 29, elevation, 3,637.95 ft (1,108.847 m); minimum daily 831,200 acre-ft (1.02 km³) Mar. 8, elevation, 3,611.87 ft (1,100.898 m).

| <u>Month</u> | <u>Water-surface elevation, in feet</u> | <u>Contents*, in acre-feet</u> | <u>Change in contents, in acre-feet</u> |
|------------------------------|---|------------------------------------|---|
| September 30, 1978 | 3,635.41 | 1,042,000 | |
| October 31 | 3,635.65 | 1,045,000 | +3,000 |
| November 30. | 3,632.30 | 1,008,000 | -37,000 |
| December 31. | 3,624.49 | 933,700 | -74,300 |
| January 31, 1979 | 3,619.26 | 890,500 | -43,200 |
| February 28. | 3,613.07 | 839,500 | -51,000 |
| March 31 | 3,618.82 | 887,300 | +47,800 |
| April 30 | 3,621.21 | 905,800 | +18,500 |
| May 31 | 3,628.03 | 965,700 | +59,900 |
| June 30. | 3,637.75 | 1,069,000 | +103,300 |
| July 31. | 3,630.80 | 992,700 | -76,300 |
| August 31. | 3,629.23 | 977,200 | -15,500 |
| September 30, 1979 | 3,629.24 | 977,300 | +100 |
| 1979 water year | | | -64,700 |

* Does not include dead storage of 18,970 acre-feet (23.4 hm³).

MONTHLY SUMMARY OF CONTENTS FOR COMPACT RESERVOIRS IN EXISTENCE ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this category which may be subject to Compact allocations was not determined. As a matter of hydrologic interest the monthend contents in acre-feet of four reservoirs are given. The first three reservoirs are in the Bighorn River basin, Wyoming, and data on contents were furnished by the U.S. Water and Power Resources Service. Tongue River Reservoir in Montana is operated under the supervision of the Water Resources Division of the Montana Department of Natural Resources and Conservation, which agency furnished operating data.

Contents, in acre-feet

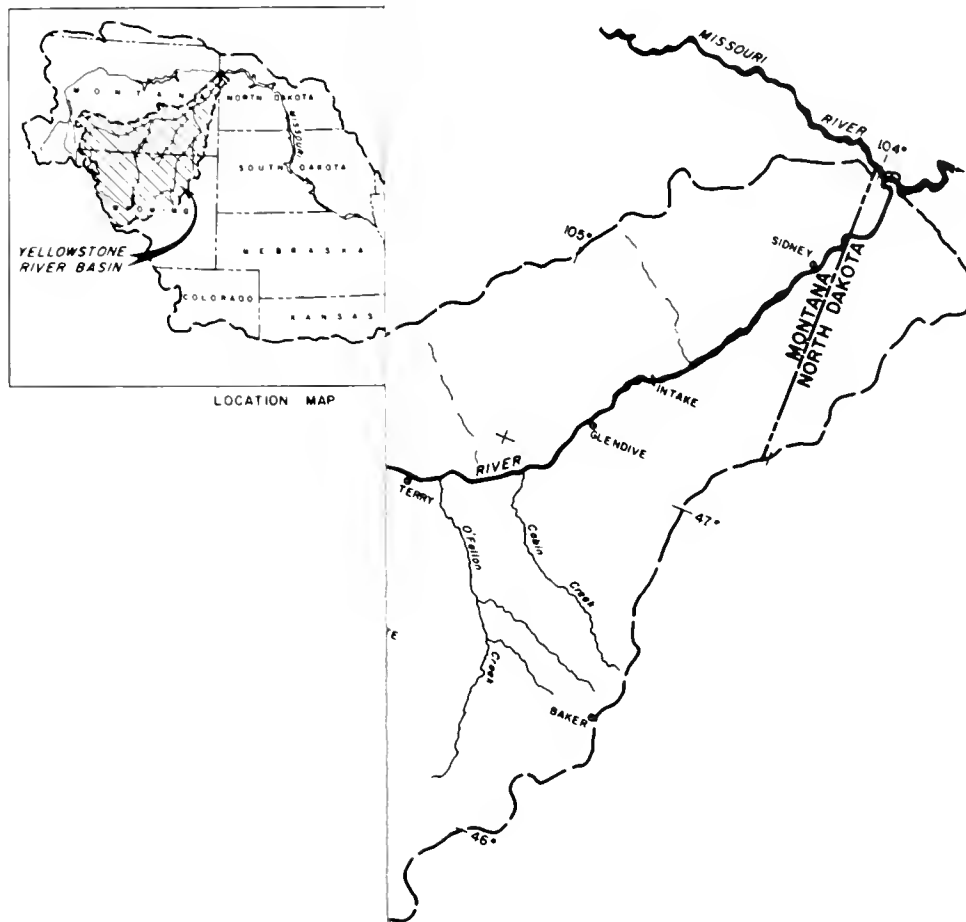
| Month | 06224500 | 06281500 | 06307000 |
|---|-------------|-------------------------|--------------------------|
| | a/Bull Lake | b/Pilot Butte Reservoir | c/Buffalo Bill Reservoir |
| September 30, 1978. . . | 107,300 | 20,750 | 348,400 |
| October 31. | 107,100 | 20,000 | 315,100 |
| November 30 | 106,200 | 19,630 | 293,300 |
| December 31 | 106,000 | 19,180 | 265,700 |
| January 31, 1979. . . . | 106,500 | 18,760 | 235,700 |
| February 28 | 106,500 | 18,400 | 224,700 |
| March 31. | 106,600 | 18,120 | 211,200 |
| April 30. | 106,600 | 18,650 | 190,900 |
| May 31. | 120,400 | 25,340 | 248,400 |
| June 30 | 136,900 | 21,050 | 373,900 |
| July 31 | 107,100 | 17,520 | 353,500 |
| August 31 | 91,200 | 20,980 | 300,400 |
| September 30, 1979. . . | 73,600 | 8,430 | 242,800 |
| Change in contents during water year. . | -33,700 | -12,320 | -105,600 |
| | | | -5,780 |

a/ Usable contents, from revised capacity table effective October 1, 1965. Dead storage is 722 acre-ft (890,000 m³).

b/ Usable contents. Dead storage is 5,360 acre-ft (6.61 hm³).

c/ Usable contents, from revised capacity table based on survey of 1959. Contents prior to October 1960 based on survey of 1941. Dead storage is negligible.

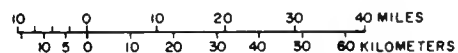
d/ Usable contents. Dead storage is 1,400 acre-ft (1.73 hm³). Contents based upon sedimentation surveys of October 1948.



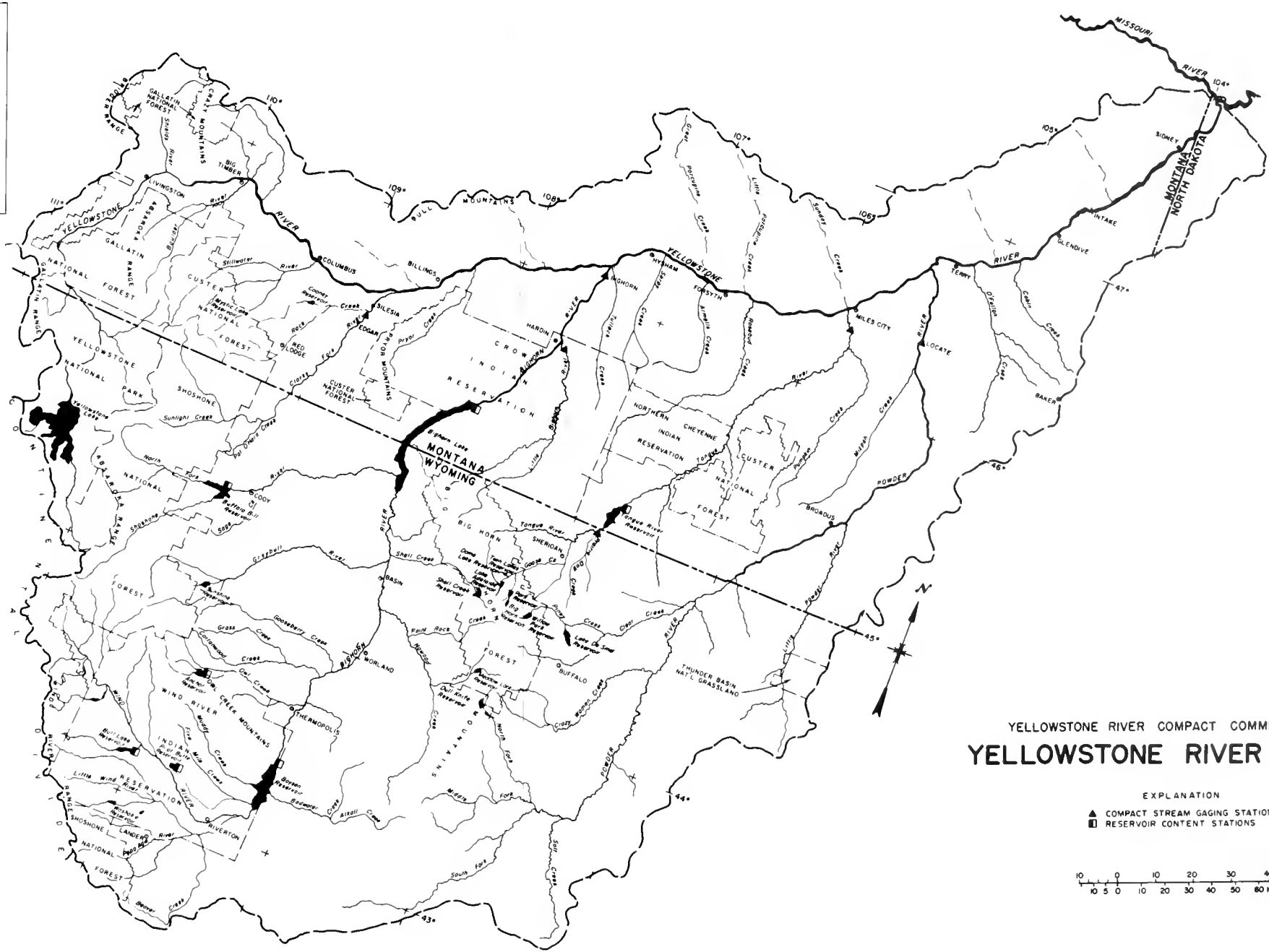
YELLOWSTONE RIVER COMPACT COMMISSION
YELLOWSTONE RIVER BASIN

EXPLANATION

- ▲ COMPACT STREAM GAGING STATIONS
- RESERVOIR CONTENT STATIONS



MAP SHOWS



YELLOWSTONE RIVER COMPACT COMMISSION
YELLOWSTONE RIVER BASIN

EXPLANATION

▲ COMPACT STREAM GAGING STATIONS
■ RESERVOIR CONTENT STATIONS

10 0 10 20 30 40 MILES
10 5 10 20 30 40 50 60 KILOMETERS

MAP SHOWING LOCATIONS OF COMPACT STREAM-GAGING AND RESERVOIR-CONTENT STATIONS

